

Appl. No. 09/521,545  
Amendment dated August 12, 2003  
Reply to Office Action of May 15, 2003

This listing of claims will replace all prior versions and listings of claims in the application:

**Listing of Claims:**

1-28. (cancelled)

29. (previously amended) A reagent composition for attaching a target molecule to the surface of a substrate, the reagent composition comprising a copolymer formed by reacting a mixture comprising:

(a) one or more monomers having pendant epoxy group in an amount of 5 to 25 mole percent based on the weight of the copolymer;

(b) one or more diluent monomers or polymers, wherein the diluent monomers or polymers comprise acrylics, vinyls, nylons, polyurethanes, or polyethers; and

(c) one or more monomers having a photoreactive group in an amount of 0.1 to 5 mole percent based on the weight of the copolymer,

wherein the photoreactive group can form a covalent bond with the surface of the substrate to attach the copolymer to the substrate and the epoxy group can form a covalent bond with the target molecule.

30. (cancelled)

31. (previously presented) The reagent composition of claim 29, wherein the diluent monomer is an acrylamide or a vinyl pyrrolidone.

32. (previously presented) The reagent composition of claim 29, wherein the photoreactive group is an aryl ketone.

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33. (previously presented) A reagent composition for attaching a target molecule to the surface of a substrate, the reagent composition comprising a polymer having one or more pendant epoxy groups, the polymer formed by reacting a mixture comprising:

- (a) hydroxyl- or amine-containing polymer; and
- (b) diepoxide;

wherein the polymer can be attached to the surface of the substrate by formation of a covalent bond and the epoxy group can form a covalent bond with the target molecule.

34. (previously presented) The reagent composition of claim 33, wherein the polymer comprising one or more pendant epoxy groups is a copolymer.

35. (previously presented) The reagent composition of claim 33, wherein the hydroxyl or amine containing polymer is a copolymer.

36. (previously presented) The reagent composition of claim 33, wherein the diepoxide comprises butanedioldiglycidyl ether, ethylene glycol diglycidyl ether, diepoxyoctane, or diepoxydecane.

37. (previously presented) The reagent composition of claim 33, wherein the target molecule comprises a nucleic acid and the surface comprises the surface of a support formed of organosilane-pretreated glass, organosilane-pretreated silicon, silicon hydride, or plastic.

38. (previously presented) The reagent composition of claim 37, wherein the nucleic acid comprises an underivatized nucleic acid.

39. (previously presented) The reagent composition of claim 38, wherein the underivatized nucleic acid comprises an oligonucleotide.

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40. (previously presented) The reagent composition of claim 33, wherein the composition further comprises one or more photoreactive groups for covalently attaching the reagent composition to the surface upon application of energy from a suitable source.

41. (previously presented) The reagent composition of claim 40, wherein the target molecule is a nucleic acid and the one or more photoreactive groups comprise photoreactive aryl ketone.

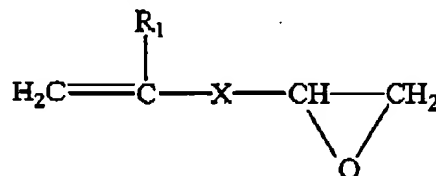
42. (currently amended) A reagent composition for attaching a nucleic acid molecule to the surface of a substrate, the reagent composition comprising a copolymer having one or more pendant epoxy groups, the copolymer formed by reacting a mixture comprising:

- (a) one or more monomers having pendant epoxy group;
- (b) one or more diluent monomers or polymers, wherein the diluent monomers or polymers comprise acrylics, vinyls, nylons, polyurethanes, or polyethers; and
- (c) one or more monomers comprising one or more photoreactive aryl ketones;

wherein the copolymer is can be attached to the surface of the substrate by formation of a covalent bond and the epoxy group can form a covalent bond with the nucleic acid molecule.

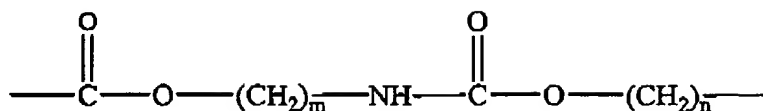
43. (previously presented) The reagent composition of claim 42, wherein the monomer comprising a pendant epoxide group comprises glycidyl acrylate, glycidyl methacrylate, allylglycidyl ether, or glycidyl vinyl ether.

44. (previously presented) The reagent composition of claim 42, wherein the monomer having a pendant epoxide group is of the formula:

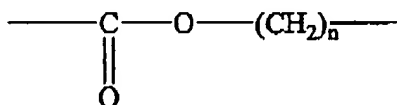


where R<sub>1</sub> is either CH<sub>3</sub> or H and X is a radical of the formula:

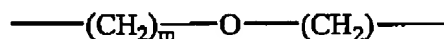
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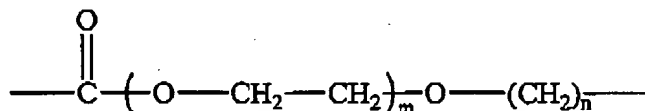
where  $m = 2-6$  and  $n = 1-10$ ;



where  $n = 1-10$



where  $m = 0$  or  $1$ ; or



where  $m = 1-20$  and  $n = 1-10$ .

45. (previously presented) The reagent composition of claim 42, wherein the surface comprises the surface of a support formed of organosilane-pretreated glass, organosilane-pretreated silicon, silicon hydride, or plastic.

46. (previously presented) The reagent composition of claim 42, wherein the nucleic acid comprises an underivatized nucleic acid.

47. (previously presented) The reagent composition of claim 46, wherein the underivatized nucleic acid comprises an oligonucleotide.

48. (previously presented) A reagent composition for attaching a target molecule to the surface of a substrate, the reagent composition comprising a copolymer formed by reacting a mixture comprising:

(a) one or more monomers having pendant epoxy group in an amount of 5 to 25 mole percent based on the weight of the copolymer;

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(b) one or more diluent monomers, the one or more diluent monomers being an acrylamide or a vinyl pyrrolidone; and

(c) one or more monomers having one or more photoreactive groups in an amount of 0.1 to 5 mole percent based on the weight of the copolymer;

wherein the one or more photoreactive groups can form a covalent bond with the surface of the substrate to attach the copolymer to the substrate and the epoxy group can form a covalent bond with the target molecule.

49. (previously presented) The reagent composition of claim 48, wherein the photoreactive group comprises aryl ketone.

① 50. (previously presented) A reagent composition for attaching a target molecule to the surface of a substrate, the reagent composition comprising a copolymer formed by reacting a mixture comprising:

(a) one or more monomers having pendant epoxy group in an amount of 5 to 25 mole percent based on the weight of the copolymer;

(b) one or more diluent monomers or polymers, wherein the diluent monomers or polymers comprise acrylics, vinyls, nylons, polyurethanes, or polyethers; and

(c) one or more monomers having one or more photoreactive aryl ketones in an amount of 0.1 to 5 mole percent based on the weight of the copolymer;

wherein the photoreactive group can form a covalent bond with the surface of the substrate to attach the copolymer to the substrate and the epoxy group can form a covalent bond with the target molecule.

51. (previously presented) The reagent composition of claim 50, wherein the diluent monomer is an acrylamide or a vinyl pyrrolidone.

52-59. (canceled)

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60. (previously presented) A reagent composition for attaching a target molecule to the surface of a substrate, the reagent composition comprising:

a copolymer of a mixture of monomers, the monomers comprising:

**one or more monomers comprising pendant epoxy group;**

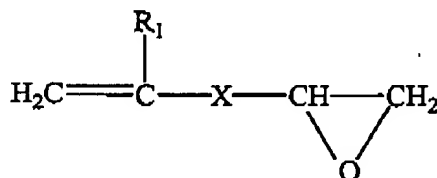
one or more diluent monomers or polymers lacking pendant epoxy group, the one or more diluent monomers or polymers comprising acrylics, vinyls, nylons, polyurethanes, or polyethers; and

one or more monomers comprising photoreactive group;

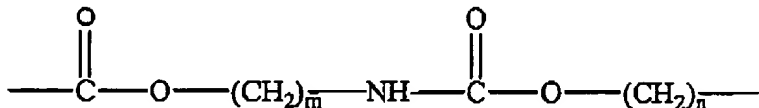
wherein the copolymer can be attached to the surface of the substrate by formation of a covalent bond and the epoxy group can form a covalent bond with the target molecule.

61. (previously presented) The reagent composition of claim 60, wherein the monomer comprising pendant epoxide group comprises glycidyl acrylate, glycidyl methacrylate, allylglycidyl ether, or glycidyl vinyl ether.

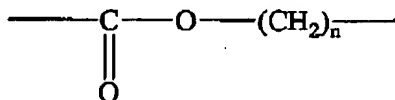
62. (previously presented) The reagent composition of claim 60, wherein the monomer comprising pendant epoxide group is of the formula:



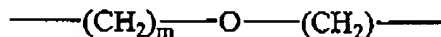
where R<sub>1</sub> is either CH<sub>3</sub> or H and X is a radical of the formula:



where  $m = 2-6$  and  $n = 1-10$ ;

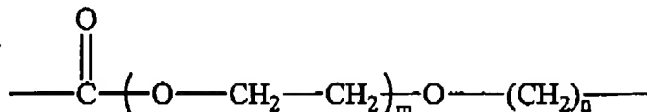


where  $n = 1-10$



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where  $m = 0$  or  $1$ ; or



where  $m = 1-20$  and  $n = 1-10$ .

63. (previously presented) The reagent composition of claim 60, wherein the target molecule comprises a nucleic acid and the surface comprises the surface of a support formed of organosilane-pretreated glass, organosilane-pretreated silicon, silicon hydride, or plastic.

64. (previously presented) The reagent composition of claim 63, wherein the nucleic acid comprises underivatized nucleic acid.

65. (previously presented) The reagent composition of claim 64, wherein the underivatized nucleic acid comprises oligonucleotide.

66. (previously presented) The reagent composition of claim 60, wherein the target molecule is nucleic acid and the one or more photoreactive groups comprise photoreactive aryl ketone.

67. (currently amended) A reagent composition for attaching a target molecule to the surface of a substrate, the reagent composition comprising a copolymer having one or more pendant epoxy groups, the copolymer formed by reacting a mixture comprising:

one or more monomers comprising pendant epoxy group;

one or more diluent monomers or polymers lacking pendant epoxy group, wherein the diluent monomers or polymers comprise acrylics, vinyls, nylons, polyurethanes, or polyethers; and

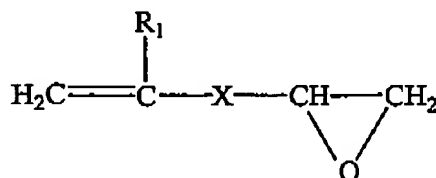
one or more monomers comprising photoreactive group;

wherein the copolymer is can be attached to the surface of the substrate by formation of a covalent bond and the epoxy group can form a covalent bond with the target molecule.

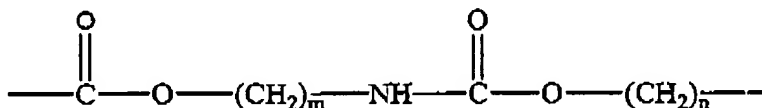
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68. (previously presented) The reagent composition of claim 67, wherein the monomer having a pendant epoxide group comprises glycidyl acrylate, glycidyl methacrylate, allylglycidyl ether, or glycidyl vinyl ether.

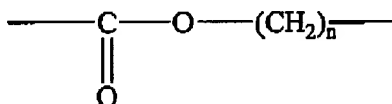
69. (previously presented) The reagent composition of claim 67, wherein the monomer having a pendant epoxide group is of the formula:



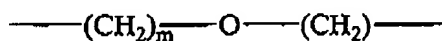
where  $\text{R}_1$  is either  $\text{CH}_3$  or  $\text{H}$  and  $\text{X}$  is a radical of the formula:



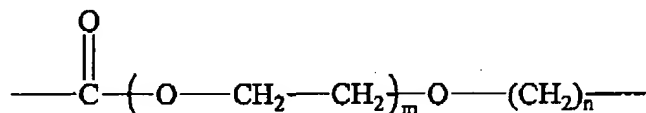
where  $m = 2-6$  and  $n = 1-10$ ;



where  $n = 1-10$



where  $m = 0$  or  $1$ ; or



where  $m = 1-20$  and  $n = 1-10$ .

70. (previously presented) The reagent composition of claim 67, wherein the reagent composition comprises a polymer synthesized by reacting hydroxyl- or amine-containing polymers with diepoxides.



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71. (previously presented) The reagent composition of claim 67, wherein the target molecule comprises a nucleic acid and the surface comprises the surface of a support formed of organosilane-pretreated glass, organosilane-pretreated silicon, silicon hydride, or plastic.

72. (previously presented) The reagent composition of claim 71, wherein the nucleic acid comprises an underivatized nucleic acid.

DI 73. (previously presented) The reagent composition of claim 72, wherein the underivatized nucleic acid comprises an oligonucleotide.

74. (previously presented) The reagent composition of claim 67, wherein the target molecule is a nucleic acid and the one or more photoreactive groups comprise photoreactive aryl ketone.

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